Electron Reconstruction Study Weekly Updates

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Medium Energy Sample

Reco cut:

truth_fiducial_evt==1 && XzUzDiff>=-2 && XzUzDiff<4 && XzVzDiff>=-2 && XzVzDiff<4 && chi2PerDoF>0 && (vtx_mod<=60 && neighborhoodEnergy/recoE_s<0.022 || vtx_mod>60 && neighborhoodEnergy/recoE_s<0.042)

Reconstructed Efficiency:

Fraction:

hist(truth_fiducial_evt==1 && XzUzDiff>=-2 && XzUzDiff<4 && XzVzDiff>=-2 && XzVzDiff<4 && chi2PerDoF>0 && (vtx_mod<=60 && neighborhoodEnergy/recoE_s<0.022 || vtx_mod>60 && neighborhoodEnergy/recoE_s<0.042)**)**

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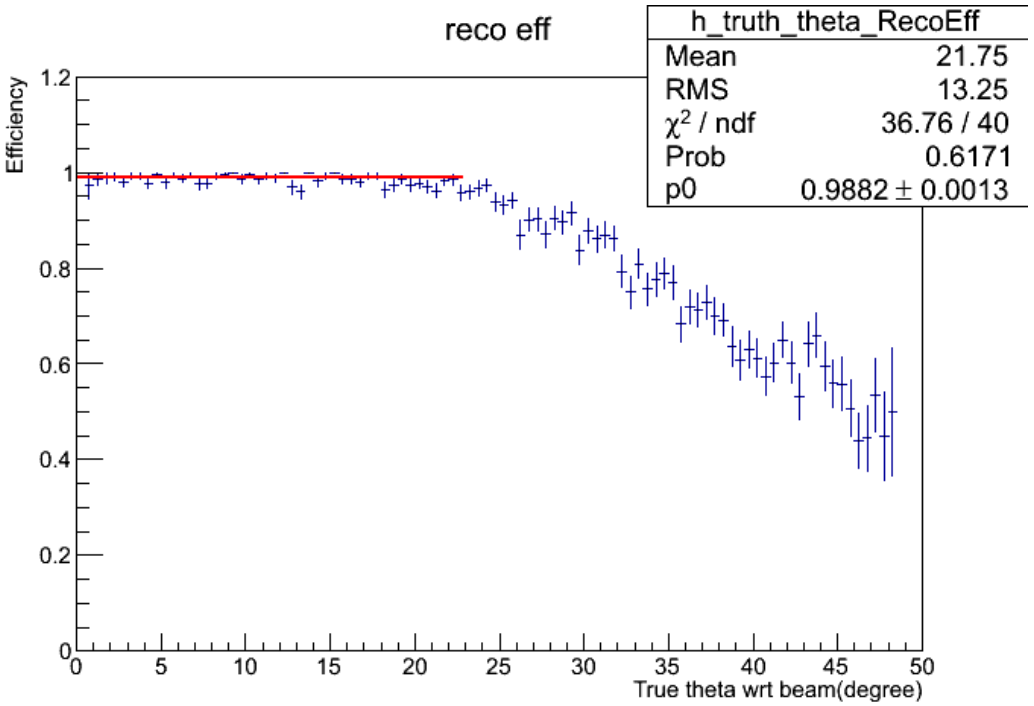
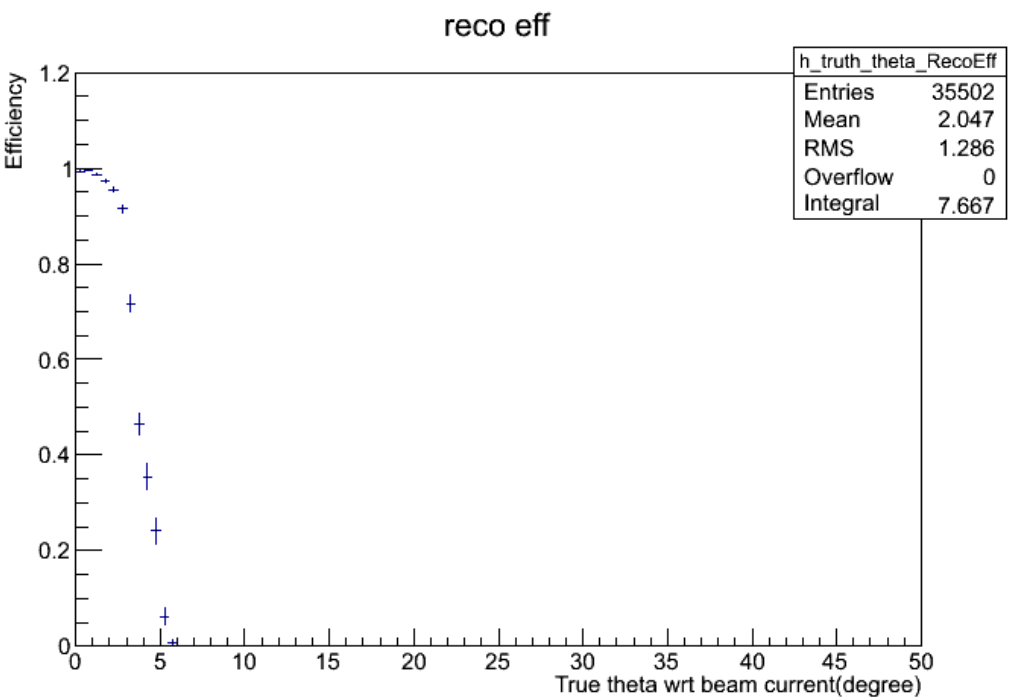
hist(truth_fiducial_evt==1**)**

Different Reco efficiency vs true theta in two samples





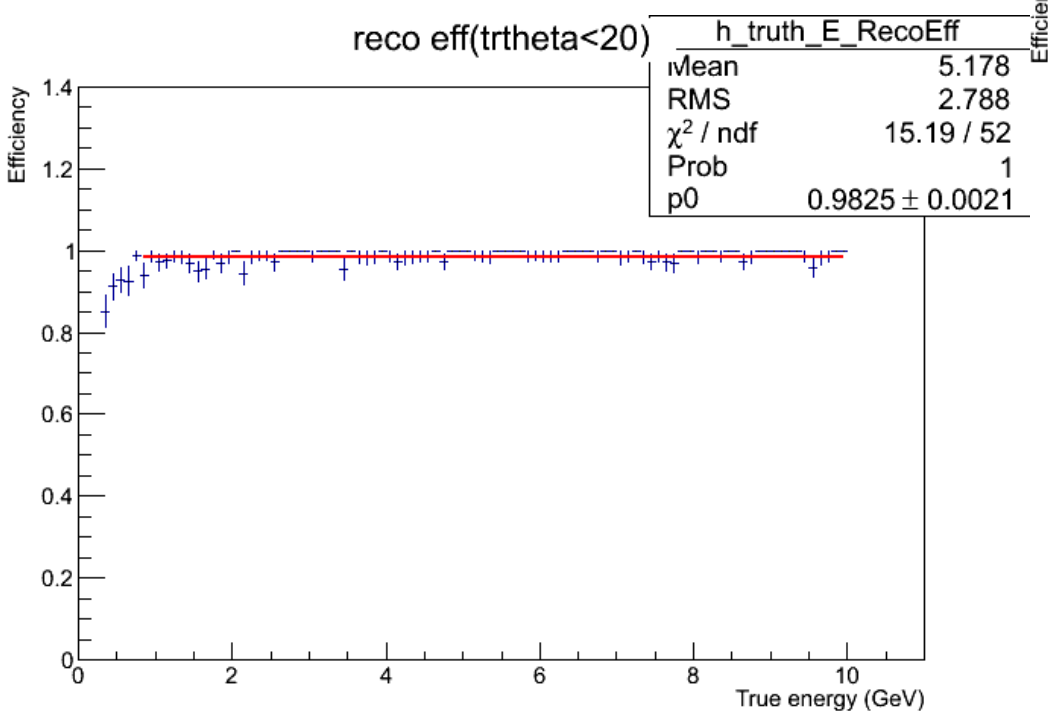
Electron Particle Gun (v10r2p3):

0-10 GeV Flat Energy spectrum;
0-45 degree angle;
Fiducial

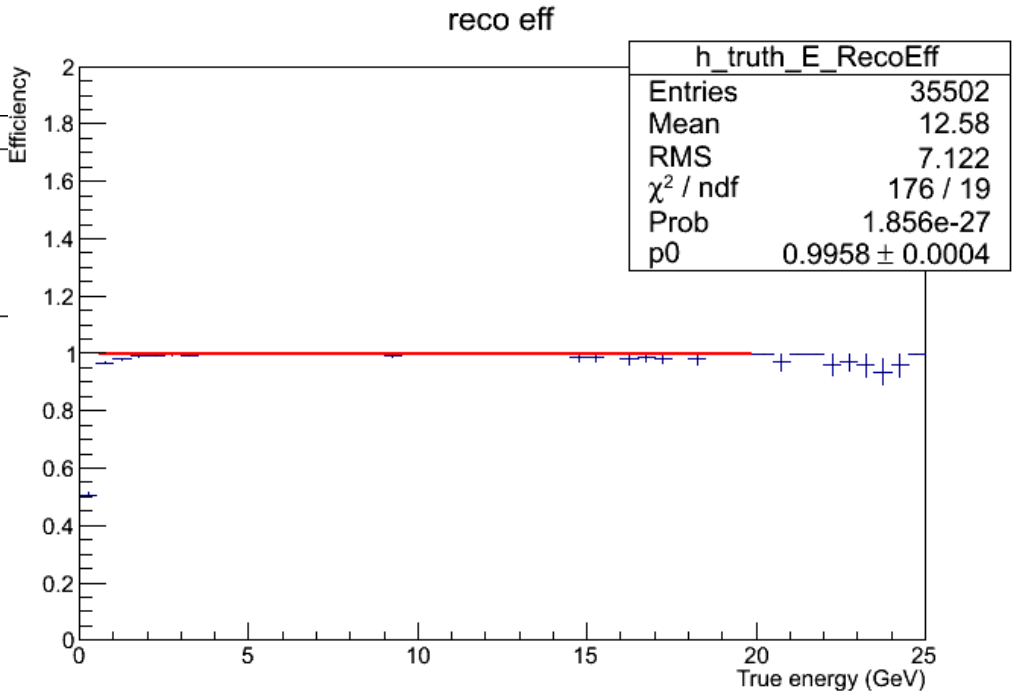
nu-e sample(v10r4p3):

ME;
200 E 20 POT;
nu-e signal only;
Fiducial

Reco eff vs true energy in two samples

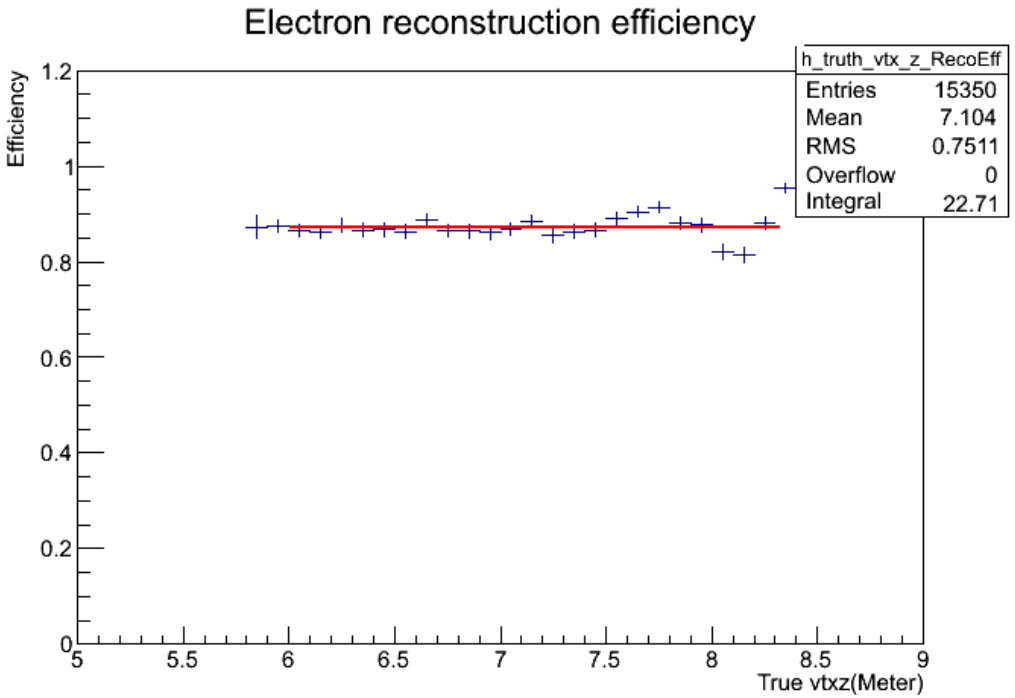


Electron Particle Gun

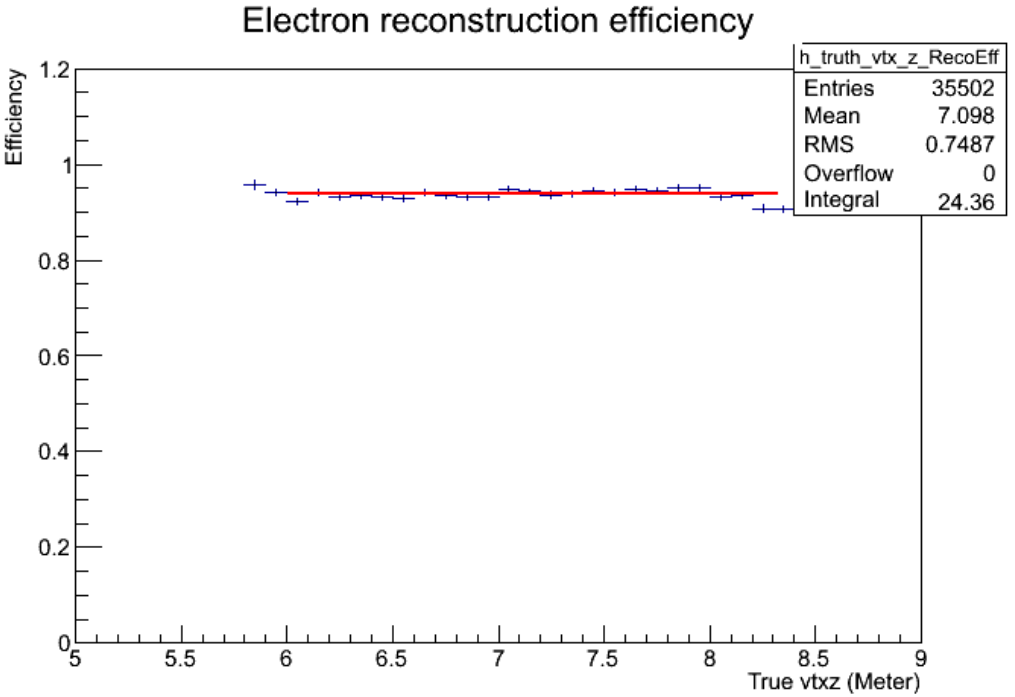


nu-e sample

Reco eff vs true energy in two samples

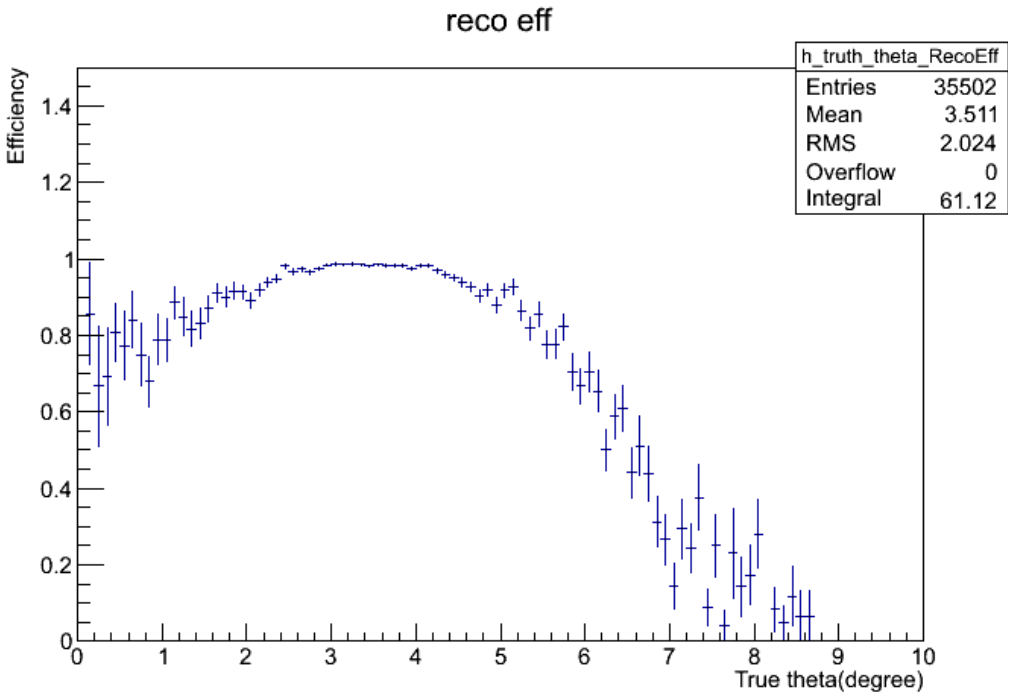


Electron Particle Gun

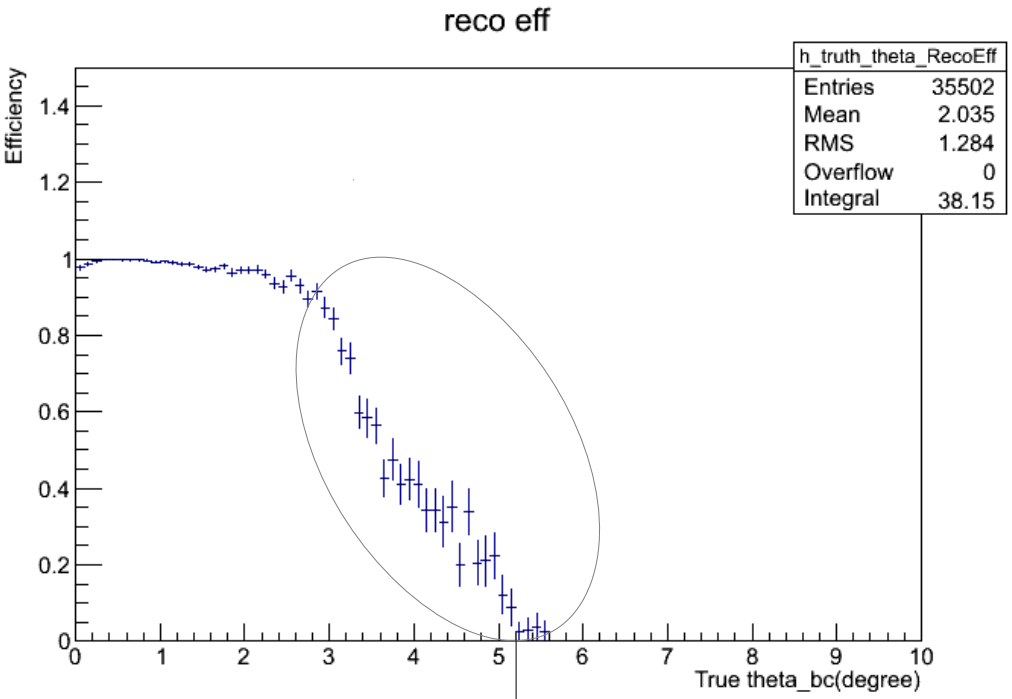


nu-e sample

Reco Efficiency vs truth theta



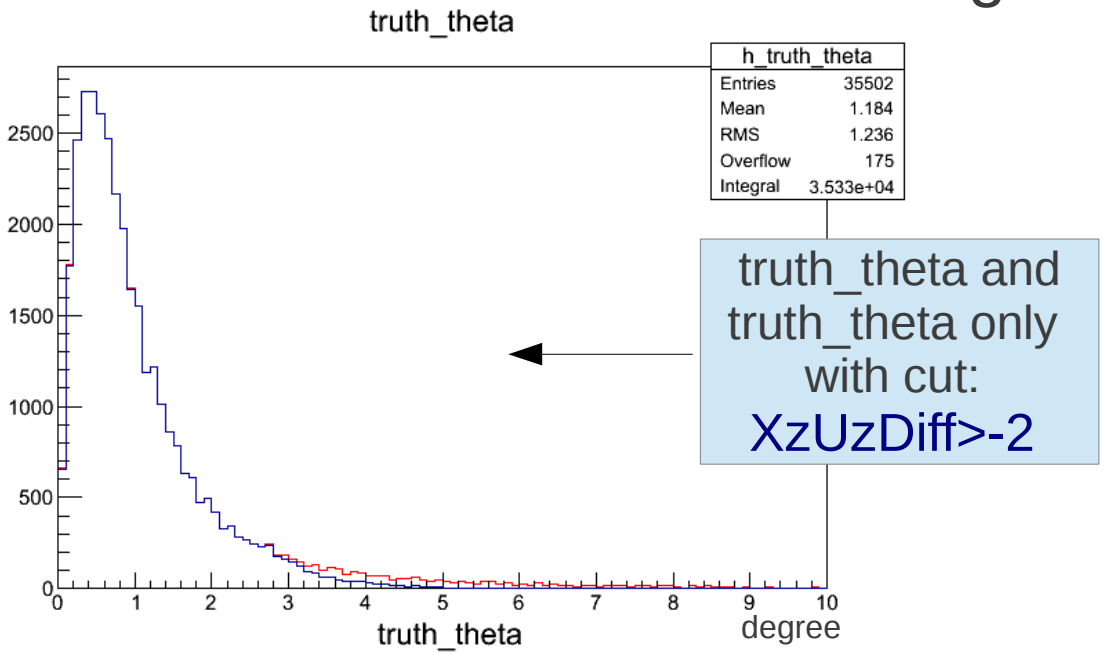
Electron Angle to the Detector



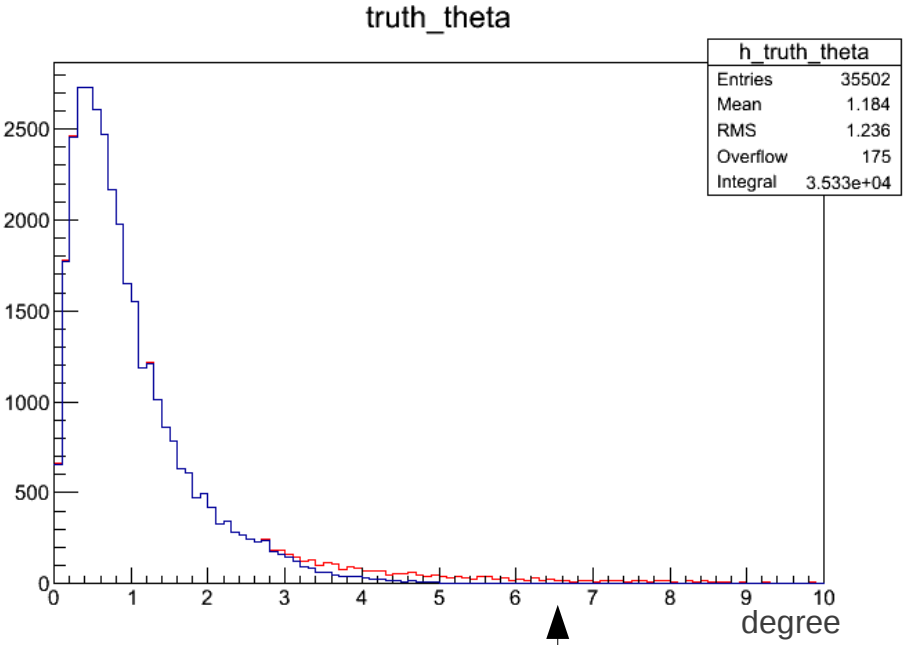
Electron Angle to the beam current

Why low eff after
3 degree?

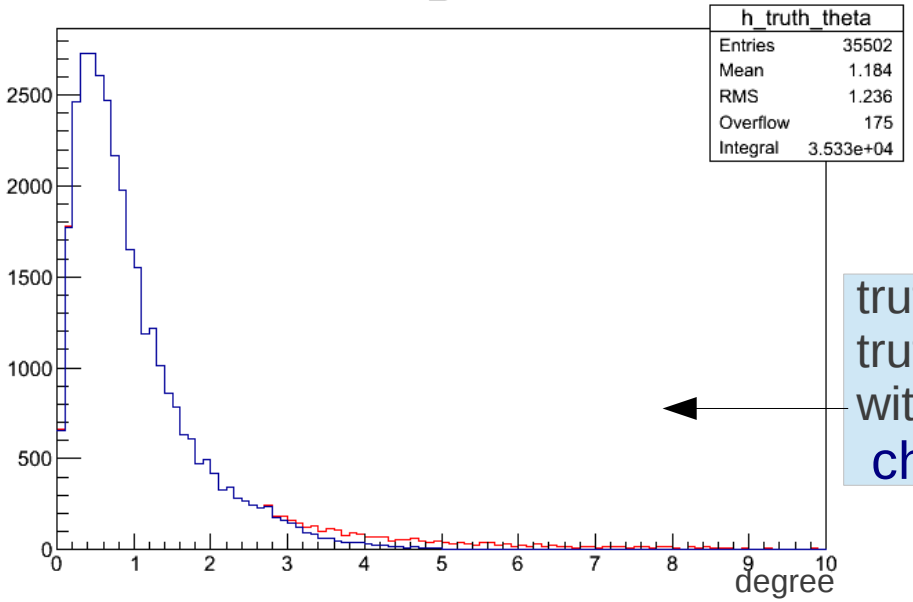
Three cuts: XzUzDiff>-2; XzVzDiff>-2; chi2PerDoF>0 in the reco quality selection dramatically decrease the event rate after 3 degree(in fiducial)



truth_theta and truth_theta only with cut: XzUzDiff>-2

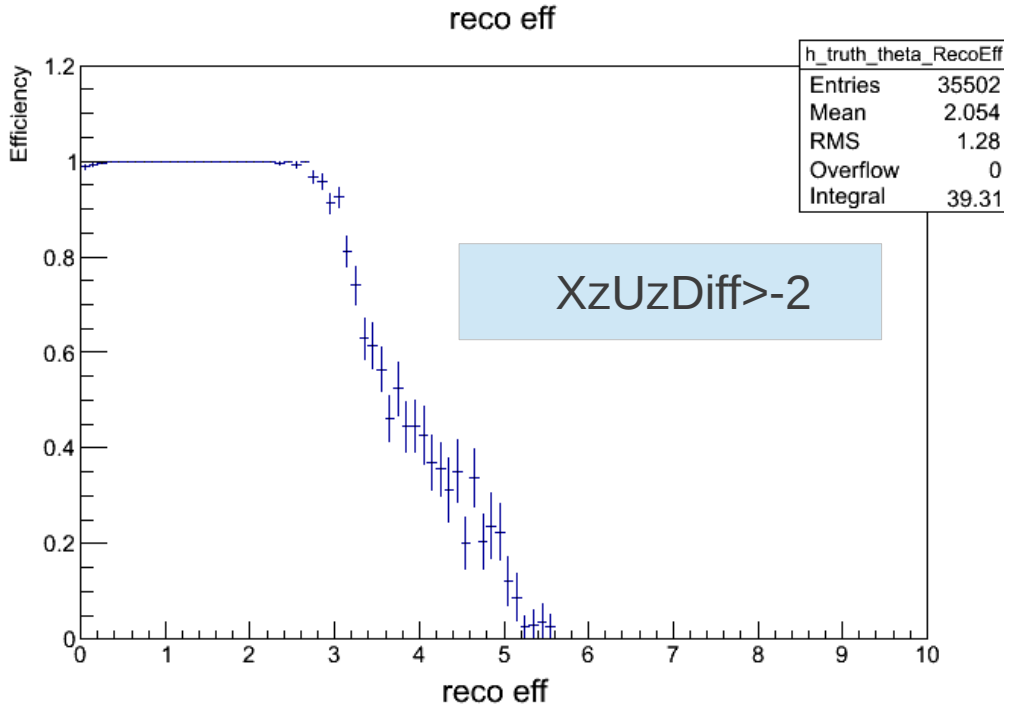


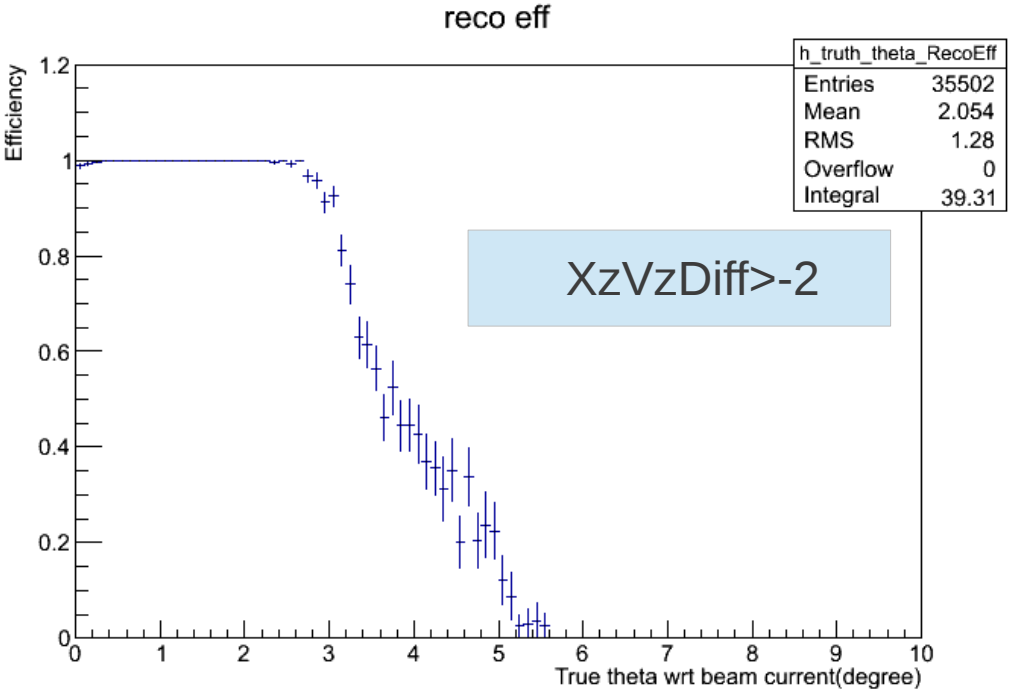
truth_theta and truth_theta only with cut: XzVzDiff>-2

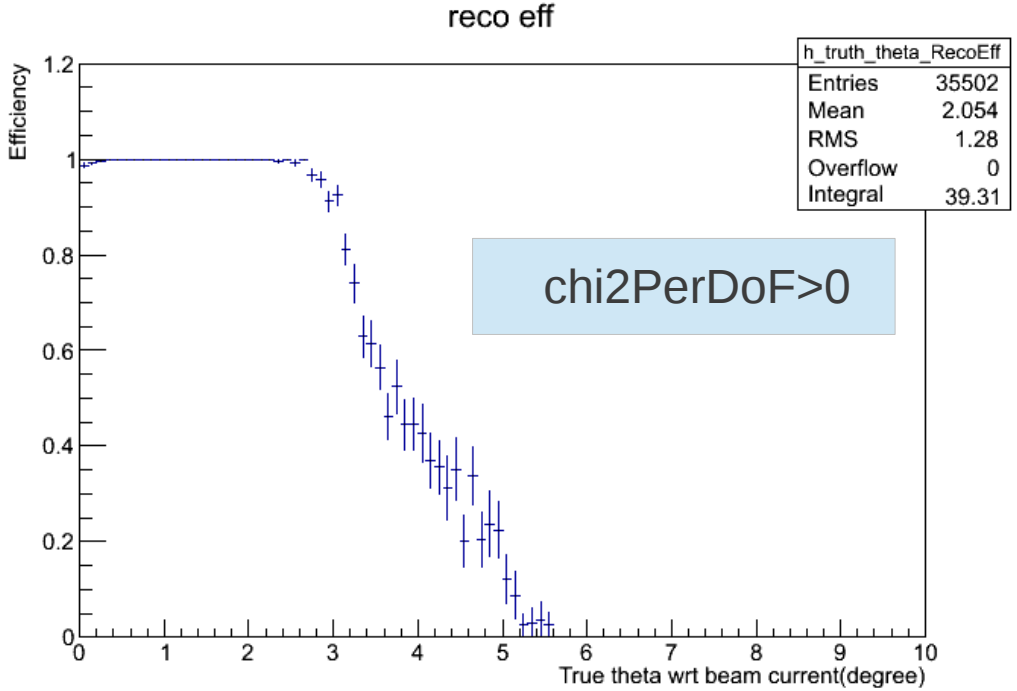


truth_theta and truth_theta only with cut: chi2PerDoF>0

Efficiency of these three cuts:
XzUzDiff>-2; XzVzDiff>-2; chi2PerDoF>0





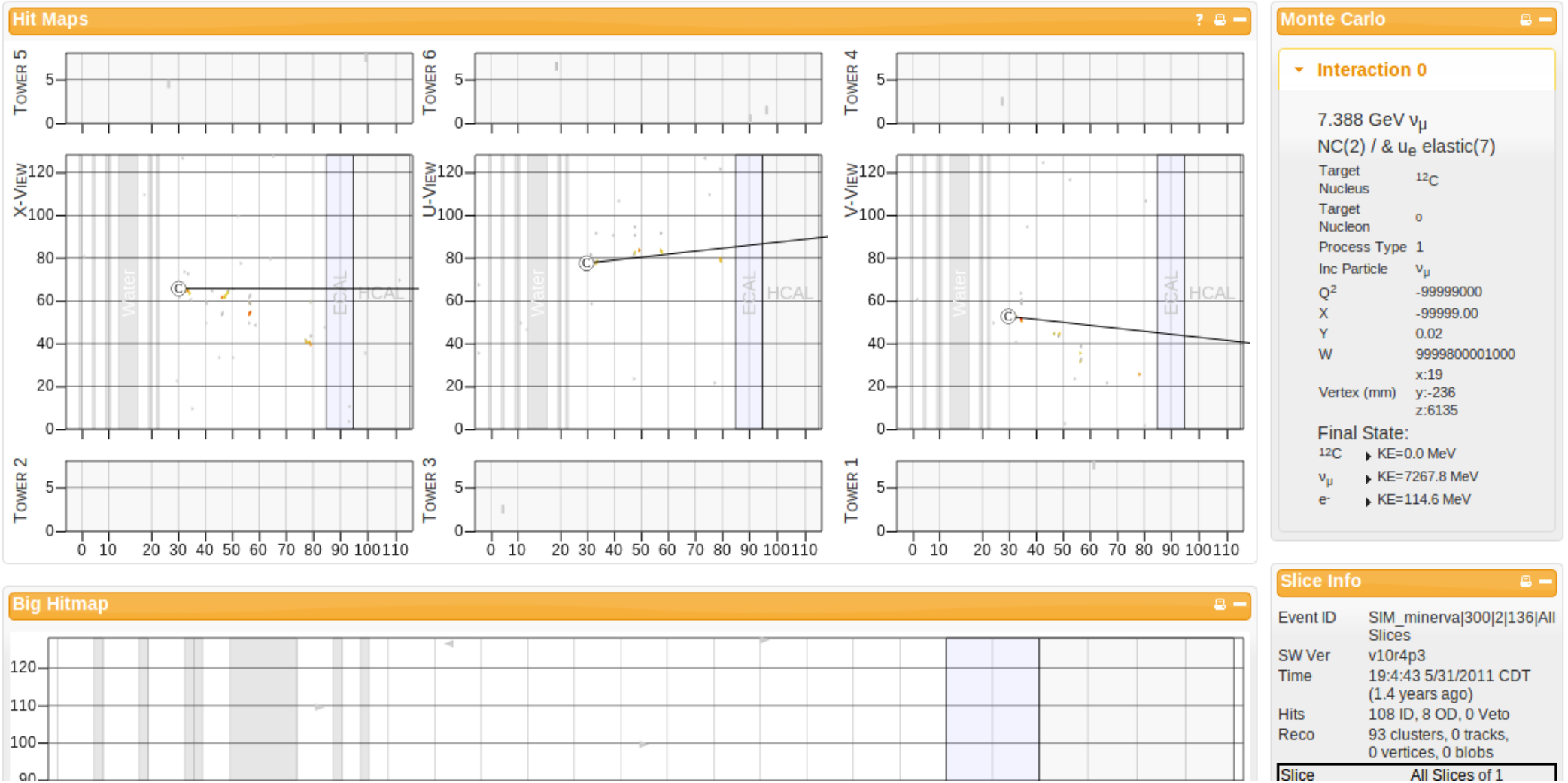


Other cuts, like
XzUzDiff<4; XzVzDiff<4;
(vtx_mod<=60 &&
neighborhoodEnergy/recoE_s<0.022 ||
vtx_mod>60 &&
neighborhoodEnergy/recoE_s<0.042)

Do not obviously lower the event rate

Feature of Events don't pass through the reco cut

Ep 2



Small e Energy

High angle

```
chain-> Scan("ev_run:ev_subrun:ev_gate:truth_theta_bc*180/3.14159:truth_E/1000",
"truth_fiducial_evt==1 && (XzVzDiff<-2 || XzVzDiff >=4)" );
```

To print out

Part of the failed events on reco cut:
XzVzDiff>=-2 && XzVzDiff<4

Here Mostly XzVzDiff =-999

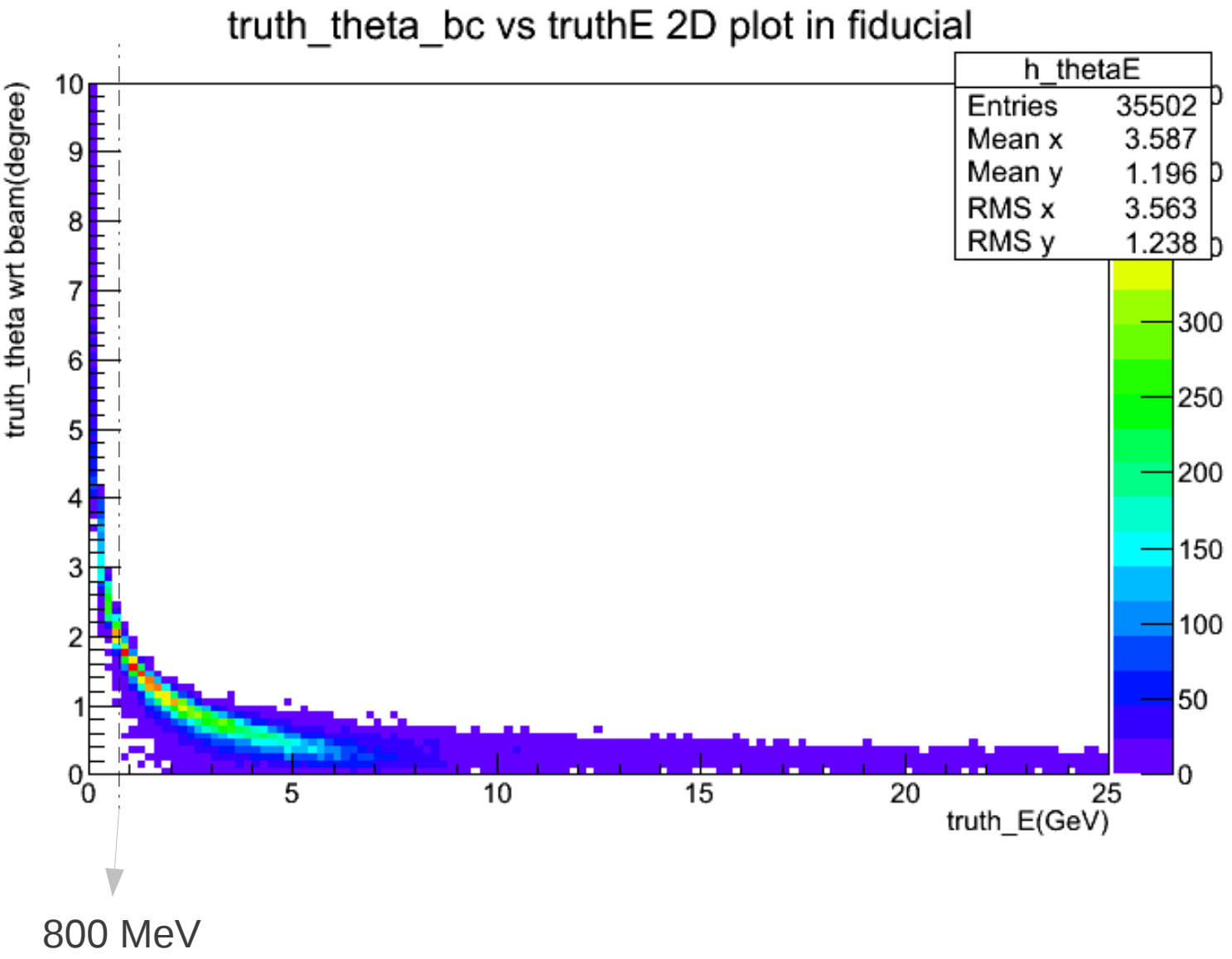
High angle and low energy

Angle to Beam (in degree)

Energy (in GeV)

ev_run	ev_subrun	ev_gate	truth_the	truth_E/1
300	1	142	4.0214322	0.1929342
300	1	246	15.557104	0.0137019
300	1	304	6.1642463	0.0823997
300	1	370	5.5415759	0.1034442
300	2	74	6.3492754	0.0810435
300	2	112	4.8904730	0.1482810
300	2	136	5.4514878	0.1145996
300	2	309	5.5100497	0.0833295
300	2	332	3.8189751	0.2239723
300	2	391	7.3471529	0.0625610
300	2	393	13.699719	0.0177161
300	2	408	3.4411513	0.2840859
300	2	466	5.3551525	0.1152862
300	2	487	5.8596196	0.0986550
300	2	524	4.8184606	0.1526599
300	2	550	4.6767904	0.1501289
300	2	554	12.315407	0.0219790
300	2	571	5.9549017	0.0930367
300	3	120	3.1043040	0.3273882
300	3	127	4.8594124	0.1413272
300	3	393	3.8592580	0.2131396
300	3	402	3.8630149	0.2075169
300	3	426	3.7472312	0.1803058
300	3	446	7.5354611	0.0580139
300	3	474	5.2857139	0.1185322

Truth_theta_bc vs Truth_E
(in fiducial)

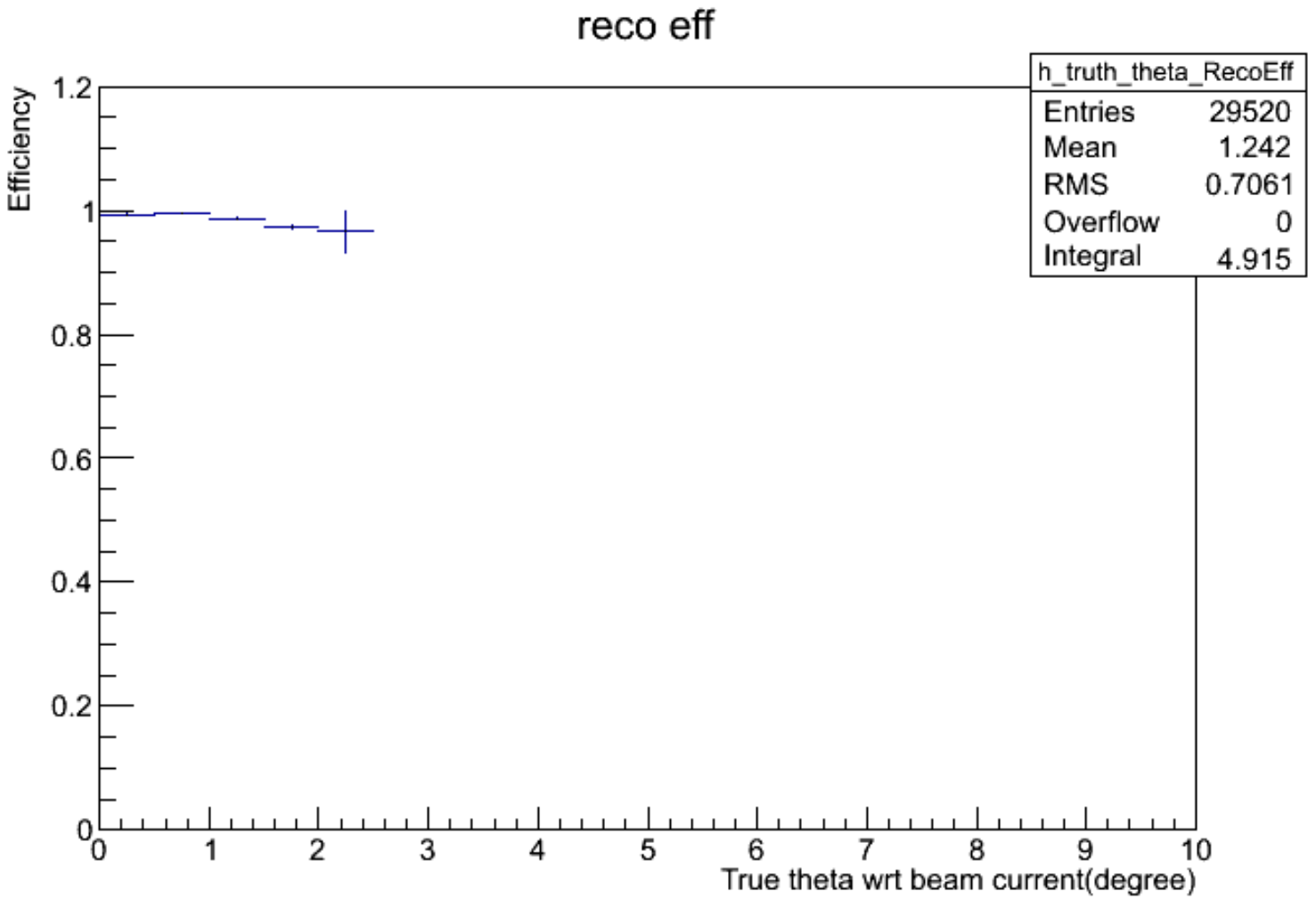


800 MeV

Dependence of electron angle and energy in nu-e sample;
But no relation of these two variables in PC sample.

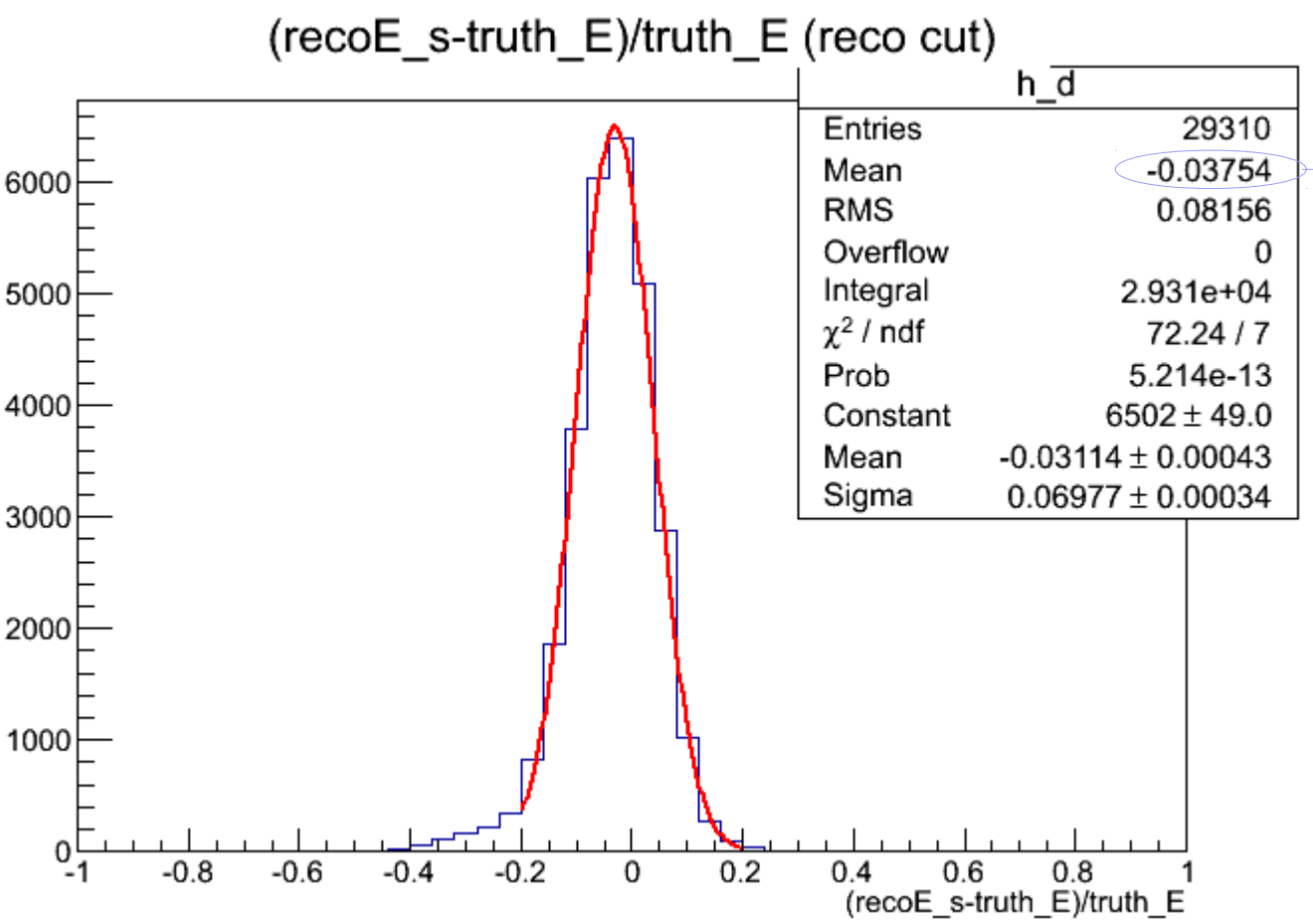
Efficiency with 800 MeV threshold cut

(fiducial)



Reco Energy Resolution with Reco Cut

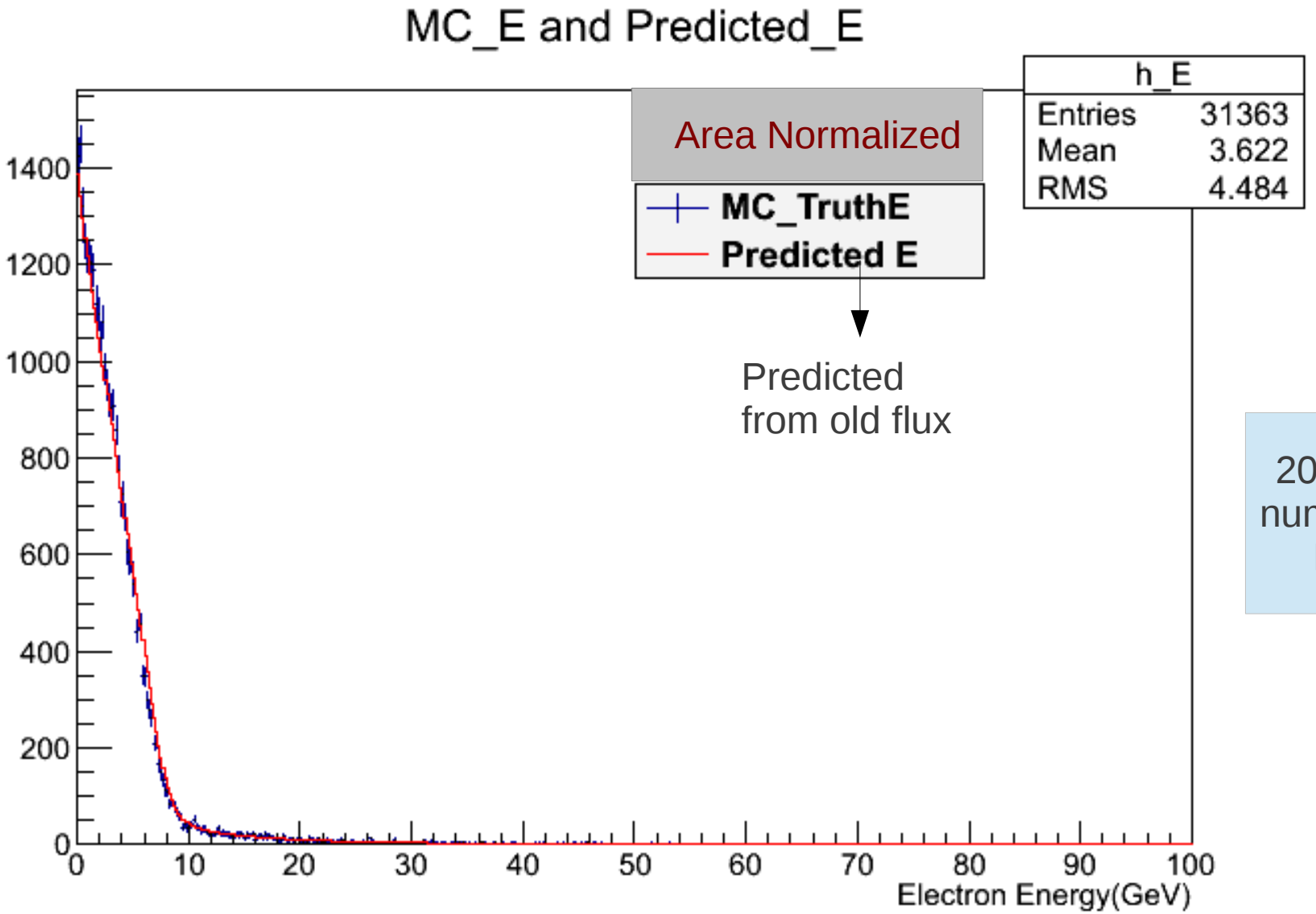
variable
recoE_s;



?

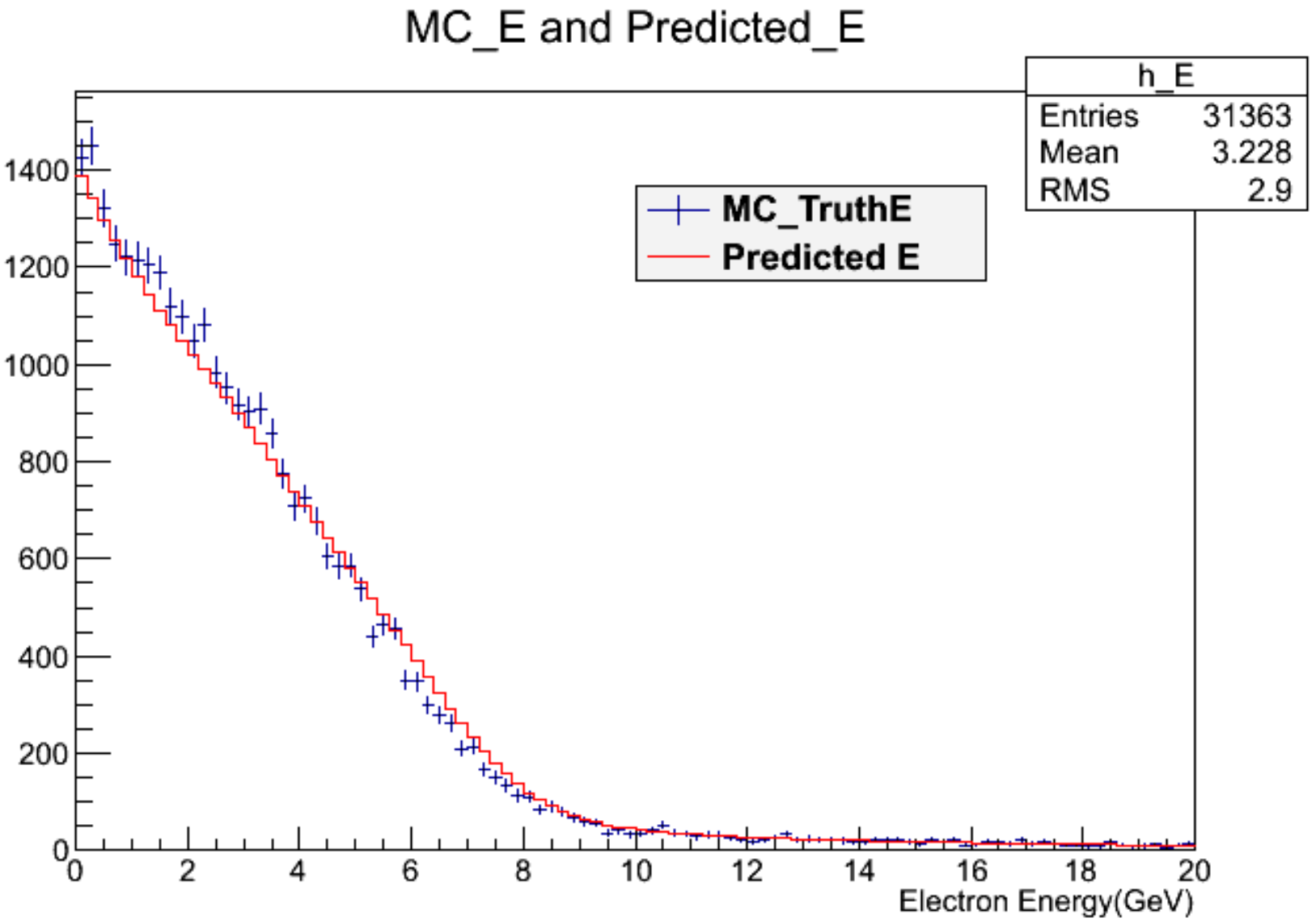
Need a correction to let the Gaussian centered

Prediction on this set of ME nu_e Sample



200 E20 POT; numu_e signal; Fiducial.

Zoomed in at 0-20 GeV



Start To Develop Fitting Tool